

Claims:

1. A system for detecting collapse of structures comprising:

a device including at least one accelerometer, said
5 accelerometer constructed so as to receive acceleration
responses from a structure in at least one axial direction;

said device including a filter and amplifier, said filter and
amplifier constructed so as to connect to said accelerometer,
said filter and amplifier further constructed so as to receive
10 said acceleration responses, remove extraneous noise from said
acceleration responses and amplify said acceleration responses;

said device including at least one transmitter, said
transmitter constructed so as to connect to said filter and
amplifier, said transmitter further constructed so as to receive
15 said filtered and amplified acceleration responses, said
transmitter further constructed so as to convert said
acceleration responses to an analog signal and transmit said
signal; and

said device including a first power source connected to said
20 accelerometer, said filter and amplifier and said transmitter,
said first power source constructed so as supply power to said
accelerometer, said filter and amplifier and said transmitter,

said first power source further constructed so as to obtain power from dependent and independent power supplies.

2. A system for detecting collapse of structures as recited in claim 1 wherein said accelerometer having a reading range of 0 to 30 Hz.

3. A system for detecting collapse of structures as recited in claim 2 wherein said independent power source comprises internal batteries.

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4. A system for detecting collapse of structures as recited in claim 3, wherein said device further comprises an external thermal casing, said casing constructed so as to protect said device from heat damages at temperatures up to 1900°F, said casing further constructed so as to be waterproof.

5. A system for detecting collapse of structures as recited in claim 4, wherein said casing comprises a face plate having an on-off indicator and an attachment means for attaching said device onto said structure.

6. A system for detecting collapse of structures as recited in claim 5, wherein said on-off indicator is selected from a group consisting of a switch mechanism, an audio signal indicator and a visual signal indicator.

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7. ^{dep. cl. 5} A system for detecting collapse of structures as recited in claim 6, wherein said attachment means comprises adhesives and bolts.

10 8. A system for detecting collapse of structures comprising:

a display apparatus including a remote receiver constructed so as to receive analog signals and transmit said analog signals;

said display apparatus including an analog to digital converter being connected to said remote receiver, said
15 converter constructed so as receive said analog signals and further constructed to convert said analog signals to digital signals;

said display apparatus including a computer, said computer being connected to said converter and constructed so as to
20 receive said digital signals, compare stored threshold data with said digital signal and obtain a resultant value; and

said display apparatus further including a second power source constructed so as to supply power to said remote receiver, said analog to digital converter and said computer, said second power source further constructed so as to obtain power from a power supply.

9. A system for detecting collapse of structures as recited in claim 8 wherein said computer further comprises a central processing unit connected to a memory unit, said central processing unit further connected to a display unit, said central processing unit further connected to an user input.

10. A system for detecting collapse of structures as recited in claim 9 wherein said power supply comprises batteries, AC sources and DC sources.

11. A system for detecting collapse of structures comprising:
a device including at least one accelerometer, said accelerometer constructed so as to receive acceleration responses from a structure in at least one axial direction;

said device including a filter and amplifier, said filter and amplifier constructed so as to connect to said accelerometer,

said filter and amplifier further constructed so as to receive said acceleration responses, remove extraneous noise from said acceleration responses and amplify said acceleration responses;

5 said device including at least one transmitter, said transmitter constructed so as to connect to said filter and amplifier, said transmitter further constructed so as to receive said filtered and amplified acceleration responses, said transmitter further constructed so as to transmit said acceleration responses as analog signals;

10 said device including a first power source connected to said accelerometer, said filter and amplifier and said transmitter, said first power source constructed so as supply power to said accelerometer, said filter and amplifier and said transmitter, said first power source further constructed so as to obtain
15 power from an independent power supply;

said system further including a display apparatus connected to said device through a supply line;

said display apparatus including a remote receiver constructed so as to receive analog signals from said transmitter;

20 said display apparatus including an analog to digital converter being connected to said remote receiver, said converter constructed so as receive said analog signals and

further constructed to convert said analog signals to digital signals;

said display apparatus including a computer, said computer being connected to said converter and constructed so as to
5 receive said digital signals, compare stored threshold data with said digital signal and obtain a resultant value;

said display apparatus further including a second power source constructed so as to supply power to said remote receiver, said analog to digital converter and said computer;

said second power source further constructed so as to obtain power from a power supply.

12. A system for detecting collapse of structures as recited in claim 11 wherein said accelerometer having a reading range of 0
15 to 30 Hz.

13. A system for detecting collapse of structures as recited in claim 12 wherein said independent power source comprises internal batteries.

14. A system for detecting collapse of structures as recited in claim 13, wherein said device further comprises an external

thermal casing, said casing constructed so as to protect said device from heat damages at temperatures up to 1900°F, said casing further constructed so as to be waterproof.

5 15. A system for detecting collapse of structures as recited in claim 14, wherein said casing comprises a face plate having an on-off indicator and an attachment means for attaching said device onto said structure.

10 16. A system for detecting collapse of structures as recited in claim 15, wherein said on-off indicator is selected from a group consisting of a switch mechanism, an audio signal indicator and a visual signal indicator.

15 17. A system for detecting collapse of structures as recited in claim 16, wherein said attachment means comprises adhesives and bolts.

20 18. A system for detecting collapse of structures as recited in claim 17, wherein said supply line comprises a waterproof, thermal coating.

19. A system for detecting collapse of structures as recited in claim 18, wherein said supply line comprises at least one wired communication line, said communication line constructed so as to connect said transmitter to said remote receiver.

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20. A system for detecting collapse of structures as recited in claim 19, wherein said supply line comprises a wired power supply line, said line constructed so as to supply power from said second power source to said first power source.

21. A system for detecting collapse of structures as recited in claim 20 wherein said computer further comprises a central processing unit connected to a memory unit, said central processing unit further connected to a display unit, said central processing unit further connected to an user input.

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22. A system for detecting collapse of structures as recited in claim 21 wherein said power supply comprises batteries, AC sources and DC sources.

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23. A system for detecting collapse of structures as recited in claim 22, wherein said first power source is further constructed so as to receive power from a second power supply housed within said structure.

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24. A system for detecting collapse of structures as recited in claim 23, wherein said second power supply comprises an AC source, a DC source and batteries.

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25. A system for detecting collapse of structures comprising:

a device including at least one accelerometer, said accelerometer constructed so as to receive acceleration responses from a structure in at least one axial direction;

said device including a filter and amplifier, said filter and amplifier constructed so as to connect to said accelerometer, said filter and amplifier further constructed so as to receive said acceleration responses, remove extraneous noise from said acceleration responses and amplify said acceleration responses;

said device including at least one transmitter, said transmitter constructed so as to connect to said filter and amplifier, said transmitter further constructed so as to receive said filtered and amplified acceleration responses, said

transmitter further constructed so as to transmit said acceleration responses as analog signals;

said device including a first power source connected to said accelerometer, said filter and amplifier and said transmitter,
5 said first power source constructed so as supply power to said accelerometer, said filter and amplifier and said transmitter, said first power source further constructed so as to obtain power from an independent power supply;

* said system including a communication means for transmitting
10 said analog signals to a display apparatus;

said display apparatus including a remote receiver constructed so as to receive said analog signals from said transmitter through said communication means;

said display apparatus including an analog to digital
15 converter being connected to said remote receiver, said converter constructed so as receive said analog signals and further constructed to convert said analog signals to digital signals;

said display apparatus including a computer, said computer
20 being connected to said converter and constructed so as to receive said digital signals, compare stored threshold data with said digital signal and obtain a resultant value;

said display apparatus further including a second power source constructed so as to supply power to said remote receiver, said analog to digital converter and said computer, said second power source further constructed so as to obtain power from a power supply.

26. A system for detecting collapse of structures as recited in claim 25 wherein said accelerometer having a reading range of 0 to 30 Hz.

27. A system for detecting collapse of structures as recited in claim 26 wherein said independent power source comprises internal batteries.

28. A system for detecting collapse of structures as recited in claim 27, wherein said device further comprises an external thermal casing, said casing constructed so as to protect said device from heat damages at temperatures up to 1900°F, said casing further constructed so as to be waterproof.

29. A system for detecting collapse of structures as recited in claim 28, wherein said casing comprises a face plate having an

on-off indicator and an attachment means for attaching said device onto said structure.

30. A system for detecting collapse of structures as recited in
5 claim 29, wherein said on-off indicator is selected from a group consisting of a switch mechanism, an audio signal indicator and a visual signal indicator.

31. A system for detecting collapse of structures as recited in
10 claim 30, wherein said attachment means comprises adhesives and bolts.

32. A system for detecting collapse of structures as recited in
15 claim 31, wherein said communication means comprises a wireless transmission system.

33. A system for detecting collapse of structures as recited in
20 claim 32 wherein said computer further comprises a central processing unit connected to a memory unit, said central processing unit further connected to a display unit, said central processing unit further connected to an user input.

34. A system for detecting collapse of structures as recited in claim 33 wherein said power supply comprises batteries, AC sources and DC sources.

5 35. A system for detecting collapse of structures as recited in claim 34, wherein said first power source is further constructed so as to receive power from a second power supply housed within said structure.

10 36. A system for detecting collapse of structures as recited in claim 35, wherein said second power supply comprises an AC source, a DC source and batteries.

15 37. A system for detecting collapse of structures comprising:
a device including at least one accelerometer, said accelerometer constructed so as to receive acceleration responses from a structure in at least one axial direction;

said device including a filter and amplifier, said filter and amplifier constructed so as to connect to said accelerometer,
20 said filter and amplifier further constructed so as to receive said acceleration responses, remove extraneous noise from said acceleration responses and amplify said acceleration responses;

said device including an analog to digital converter constructed so as to connect to said filter and amplifier, said converter further constructed so as to convert said acceleration responses to digital signals;

5 ✂ said device including a processor constructed so as to connect to said converter, said processor further constructed so as to process said digital signals;

✂ said device including an identifier, constructed so as to connect to said processor, said identifier further constructed so as to identify data from said device;

10 said device including at least one transmitter, said transmitter constructed so as to connect to said filter and amplifier, said transmitter further constructed so as to receive said filtered and amplified acceleration responses, said
15 transmitter further constructed so as to transmit said digital signals;

said device including a first power source connected to said accelerometer, said filter and amplifier, said analog to digital converter, said processor, said identifier and said transmitter,
20 said first power source constructed so as supply power to said accelerometer, said filter and amplifier, said analog to digital converter, said processor, said identifier and said transmitter,

said first power source further constructed so as to obtain power from an independent power supply.

38. A system for detecting collapse of structures as recited in claim 37 wherein said accelerometer having a reading range of 0 to 30 Hz.

39. A system for detecting collapse of structures as recited in claim 38 wherein said independent power source comprises internal batteries.

40. A system for detecting collapse of structures as recited in claim 39, wherein said device further comprises an external thermal casing, said casing constructed so as to protect said device from heat damages at temperatures up to 1900°F, said casing further constructed so as to be waterproof.

41. A system for detecting collapse of structures as recited in claim 40, wherein said casing comprises a face plate having an on-off indicator and an attachment means for attaching said device onto said structure.

42. A system for detecting collapse of structures as recited in claim 41, wherein said on-off indicator is selected from a group consisting of a switch mechanism, an audio signal indicator and a visual signal indicator.

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43. A system for detecting collapse of structures as recited in claim 42, wherein said attachment means comprises adhesives and bolts.

10 44. A system for detecting collapse of structures comprising:

— a display apparatus including a remote receiver constructed so as to receive said digital signals from said transmitter;

15 said display apparatus including a computer, said computer being connected to said receiver constructed so as to receive said digital signals, compare stored threshold data with said digital signal and obtain a resultant value;

said display apparatus further including a second power source constructed so as to supply power to said remote receiver and said computer;

20 said second power source further constructed so as to obtain power from a power supply.

45. A system for detecting collapse of structures as recited in claim 44, wherein said computer further comprises a central processing unit connected to a memory unit, said central processing unit further connected to a display unit, said
5 central processing unit further connected to an user input.

46. A system for detecting collapse of structures as recited in claim 45 wherein said power supply comprises batteries, AC sources and DC sources.

47. A system for detecting collapse of structures comprising:

a device including at least one accelerometer, said accelerometer constructed so as to receive acceleration responses from a structure in at least one axial direction;

15 said device including a filter and amplifier, said filter and amplifier constructed so as to connect to said accelerometer, said filter and amplifier further constructed so as to receive said acceleration responses, remove extraneous noise from said acceleration responses and amplify said acceleration responses;

20 said device including an analog to digital converter constructed so as to connect to said filter and amplifier, said

converter further constructed so as to convert said acceleration responses to digital signals;

5 said device including a processor constructed so as to connect to said converter, said processor further constructed so as to process said digital signals;

 said device including an identifier, constructed so as to connect to said processor, said identifier further constructed so as to identify data from said device;

10 said device including at least one transmitter, said transmitter constructed so as to connect to said filter and amplifier, said transmitter further constructed so as to receive said filtered and amplified acceleration responses, said transmitter further constructed so as to transmit said digital signals;

15 said device including a first power source connected to said accelerometer, said filter and amplifier, said analog to digital converter, said processor, said identifier and said transmitter, said first power source constructed so as supply power to said accelerometer, said filter and amplifier, said analog to digital
20 converter, said processor, said identifier and said transmitter, said first power source further constructed so as to obtain power from an independent power supply;

said system further including a display apparatus connected to said device through a supply line;

said display apparatus including a remote receiver constructed so as to receive said digital signals from said transmitter;

5 said display apparatus including a computer, said computer being connected to said receiver constructed so as to receive said digital signals, compare stored threshold data with said digital signal and obtain a resultant value;

said display apparatus further including a second power source constructed so as to supply power to said remote receiver and said computer;

said second power source further constructed so as to obtain power from a power supply.

15 48. A system for detecting collapse of structures as recited in claim 47 wherein said accelerometer having a reading range of 0 to 30 Hz.

49. A system for detecting collapse of structures as recited
20 in claim 48 wherein said independent power source comprises internal batteries.

50. A system for detecting collapse of structures as recited in claim 49, wherein said device further comprises an external thermal casing, said casing constructed so as to protect said device from heat damages at temperatures up to 1900°F, said casing further constructed so as to be waterproof.

51. A system for detecting collapse of structures as recited in claim 50, wherein said casing comprises a face plate having an on-off indicator and an attachment means for attaching said device onto said structure.

52. A system for detecting collapse of structures as recited in claim 51, wherein said on-off indicator is selected from a group consisting of a switch mechanism, an audio signal indicator and a visual signal indicator.

53. A system for detecting collapse of structures as recited in claim 52, wherein said attachment means comprises adhesives and bolts.

54. A system for detecting collapse of structures as recited in claim 53, wherein said supply line comprises a waterproof, thermal coating.

5 55. A system for detecting collapse of structures as recited in claim 54, wherein said supply line comprises at least one wired communication line, said communication line constructed so as to connect said transmitter to said remote receiver.

10 56. A system for detecting collapse of structures as recited in claim 55, wherein said supply line comprises a wired power supply line, said line constructed so as to supply power from said second power source to said first power source.

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20 57. A system for detecting collapse of structures as recited in claim 56 wherein said computer further comprises a central processing unit connected to a memory unit, said central processing unit further connected to a display unit, said central processing unit further connected to an user input.

58. A system for detecting collapse of structures as recited in claim 57 wherein said power supply comprises batteries, AC sources and DC sources.

5 59. A system for detecting collapse of structures as recited in claim 58, wherein said first power source is further constructed so as to receive power from a second power supply housed within said structure.

10 60. A system for detecting collapse of structures as recited in claim 59, wherein said second power supply comprises an AC source, a DC source and batteries.

61. A system for detecting collapse of structures comprising:

15 a device including at least one accelerometer, said accelerometer constructed so as to receive acceleration responses from a structure in at least one axial direction;

said device including a filter and amplifier, said filter and amplifier constructed so as to connect to said accelerometer,
20 said filter and amplifier further constructed so as to receive said acceleration responses, remove extraneous noise from said acceleration responses and amplify said acceleration responses;

said device including an analog to digital converter constructed so as to connect to said filter and amplifier, said converter further constructed so as to convert said acceleration responses to digital signals;

5 said device including a processor constructed so as to connect to said converter, said processor further constructed so as to process said digital signals;

10 said device including an identifier, constructed so as to connect to said processor, said identifier further constructed so as to identify data from said device;

15 said device including at least one transmitter, said transmitter constructed so as to connect to said filter and amplifier, said transmitter further constructed so as to receive said filtered and amplified acceleration responses, said transmitter further constructed so as to transmit said digital signals;

20 said device including a first power source connected to said accelerometer, said filter and amplifier, said analog to digital converter, said processor, said identifier and said transmitter, said first power source constructed so as supply power to said accelerometer, said filter and amplifier, said analog to digital converter, said processor, said identifier and said transmitter,

said first power source further constructed so as to obtain power from an independent power supply;

said system including a communication means for transmitting said digital signals to a display apparatus;

5 said display apparatus including a remote receiver constructed so as to receive said digital signals from said transmitter through said communication means;

10 said display apparatus including a computer, said computer being connected to said receiver constructed so as to receive said digital signals, compare stored threshold data with said digital signal and obtain a resultant value;

15 said display apparatus further including a second power source constructed so as to supply power to said remote receiver and said computer;

20 said second power source further constructed so as to obtain power from a power supply.

62. A system for detecting collapse of structures as recited in claim 61 wherein said accelerometer having a reading range of 0 to 30 Hz.

63. A system for detecting collapse of structures as recited in claim 62 wherein said independent power source comprises internal batteries.

5 64. A system for detecting collapse of structures as recited in claim 63, wherein said device further comprises an external thermal casing, said casing constructed so as to protect said device from heat damages at temperatures up to 1900°F, said casing further constructed so as to be waterproof.

10 65. A system for detecting collapse of structures as recited in claim 64, wherein said casing comprises a face plate having an on-off indicator and an attachment means for attaching said device onto said structure.

15 66. A system for detecting collapse of structures as recited in claim 65, wherein said on-off indicator is selected from a group consisting of a switch mechanism, an audio signal indicator and a visual signal indicator.

67. A system for detecting collapse of structures as recited in claim 66, wherein said attachment means comprises adhesives and bolts.

5 68. A system for detecting collapse of structures as recited in claim 67, wherein said communication means comprises a wireless transmission system.

69. A system for detecting collapse of structures as recited in claim 68 wherein said computer further comprises a central processing unit connected to a memory unit, said central processing unit further connected to a display unit, said central processing unit further connected to an user input.

10 70. A system for detecting collapse of structures as recited in claim 69 wherein said power supply comprises batteries, AC sources and DC sources.

15 71. A system for detecting collapse of structures as recited in claim 70, wherein said first power source is further constructed so as to receive power from a second power supply housed within said structure.

72. A system for detecting collapse of structures as recited in claim 71, wherein said second power supply comprises an AC source, a DC source and batteries.

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73. A method for detecting collapse of structures comprising:

(a) attaching a device having at least one accelerometer, a filter and amplifier, at least one transmitter and an on-off indicator onto an exterior surface of a structure;

(b) monitoring acceleration responses using said at least one accelerometer;

(c) reducing noise and amplifying said responses using said filter and amplifier;

(d) converting said response to an analog signal;

(e) transmitting said signal to a remote receiver using said transmitter;

(f) receiving said signal using said remote receiver and transmitting said signal to a computer;

(g) digitizing said signal using said computer and comparing said signal to a threshold value;

(h) transmitting said digitized signal from said computer to said device;

- (i) displaying said signal on said device; and
- (j) notifying an operator of collapse situation of said structure using said device.

5 74. A method for detecting collapse of structures as recited in claim 73 and further comprising:
monitoring acceleration responses during burn of said structure,
collapse of said structure and post collapse of said structure.

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